IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Applicant(s)	: Manyak et al.	
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Title	: Receptor Selectivity Mapping	

Commissioner for Patents
P.O. Box 1450
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Appellants' Brief Under 37 CFR §1.191

Sir:

This paper is Appellants' brief filed under 37 CFR §1.191 in response to the Examiner's Final Action mailed March 7, 2007.

I. REAL PARTY IN INTEREST

The real party in interest is Novascreen Biosciences Corporation, which is the assignee of the entire right, title, and interest in the application involved in the appeal. The inventors assigned the application to Oceanix Biosciences Corporation. That assignment is recorded at Reel 011365, Frame 0476 in the Assignment Division of the United States Patent and Trademark Office. On August 9, 2000 Oceanix Biosciences Corporation changed its name to Novascreen Biosciences Corporation. In October of 2005, Novascreen Biosciences Corporation became a wholly-owned subsidiary of Caliper Life Sciences, Inc.

II. RELATED APPEALS AND INTERFERENCES

Appellants are not aware of any related appeals, interferences, or judicial proceedings.

III. STATUS OF CLAIMS

Claims 1-43, 58-105, 107, 108, 110-129, 132, 139-142, 144, and 145 are pending. Of those claims, claims 4-9, 11-13, 24-26, 29-32, 58, 65, 66, 69, and 111-119 have been withdrawn from consideration. The rejection of claims 1-3, 10, 14-23, 27, 28, 33-43, 59-64, 67, 68, 70-105, 107, 108, 110, 120-129, 132, 139-142, 144, and 145 is at issue in this appeal.

IV. STATUS OF AMENDMENTS

No amendments have been filed subsequent to the final rejection.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The claims in the pending application relate to the use of databases in drug discovery and development. *As-Filed Application* pg. 2 lines 8-15. To understand the utility of the claimed invention, one must understand the difficulties inherent in the drug development process. A general outline of the industry-standard drug discovery process in the "Description of the Related Art" portion of the specification, which begins on pg. 2 of the *As-Filed Application*.

At the highest level of abstraction, the process of developing a drug to treat a particular disease or condition comprises the steps of (1) identifying the relevant molecular targets, which are naturally occurring compounds (typically genes or proteins) within the body that are associated with the particular disease or condition; (2) exposing the relevant molecular targets to a number of chemical compounds *in vitro* (i.e. in a test tube or microplate) to identify whether those compounds have an activity against the relevant targets that tends to mitigate the particular disease or condition; (3) subjecting the active compounds to additional *in vitro* tests that are designed to predict side effects as well as properties such as toxicity, absorption, distribution, metabolism, and excretion; (4) producing a number of chemical analogs (i.e. chemicals with modified but related structures) of the most promising active compounds; (5) subjecting the chemical analogs to steps (2) and (3); and (6) selecting the most promising chemical compounds and/or analogs for preclinical and clinical testing in animals and humans. In spite of the complexity of the drug development process, many of the most promising compounds fail in the expensive preclinical and clinical testing phases. These failures make the average cost of developing a drug extremely high, with some estimates of that average cost exceeding $300 million. Improving the drug development process, so that the failure rate in preclinical and clinical testing is reduced, has the potential of reducing the cost of developing a drug by as much as 75%.

The claimed subject matter at issue in this appeal provide improved drug development processes that are designed to better predict how a chemical compound will perform in preclinical and clinical testing. More specifically, the pending application describes computer systems for managing, collating, interpreting, and utilizing the vast amount of data generated in steps (2) and (3) in the process described above, and combining those data with other useful data in order to improve the ability of researchers to identify the optimal compounds for preclinical and clinical testing. The computer systems in the pending claims employ information from three databases to predict how a new chemical compound being evaluated as a potential drug will perform during preclinical and clinical testing.

In some of the claimed embodiments, one of the three databases is a "biological activity" database containing "biological information related to the effects of such chemical compounds on biological systems." See, e.g., pending Claim 1. The biological activity database is described in detail in the section of the *As-Filed Application* starting at pg. 24 line 15 and

ending at pg. 26 line 8. As explained in that section, the biological activity database contains actual clinical data from both FDA-approved drugs and drugs that have failed clinical trials. The clinical data in the biological activity database includes data related to toxicity, absorption of the compound by the body, distribution of the compound within the body, how the body metabolizes the compound, side effects, and effectiveness. It is worth noting that the data contained in the biological activity database is *in vivo* (generated within a living organism) data, as opposed to the *in vitro* (generated within a laboratory) data associated with steps (2) and (3) of the previously-described drug development process. A biological activity database is the "first database" in claims 1, 35, 37, 139, and 142.

In all claimed embodiments of the invention, there is "a second database containing records corresponding to a plurality of molecular targets." See, e.g., pending Claim 1. The molecular target database is described in detail in the section of the *As-Filed Application* starting at pg. 21 line 1 and ending at pg. 24 line 13. The molecular target database contains genetic and chemical information about the naturally occurring compounds (typically genes or proteins) within the body that are associated with the particular disease or condition to be treated. Examples of the naturally occurring compounds include receptors, enzymes, proteins, nucleic acids, carbohydrates, and other macromolecules. A molecular target database is the "second database" in claims 1, 35, 37, 139, and 142.

In all claimed embodiments of the invention, there is "a third database containing records corresponding to screening results from *in vitro* assays measuring interactions between each of a plurality of compounds in the first data base and each of a plurality of molecular targets in the second database." See, e.g., pending Claim 1. This interaction database contains the type of data generated in step (2) of the above-described drug-development process. The interaction database is described in detail in the section of the *As-Filed Application* starting at pg. 26 line 10 and ending at pg. 31 line 15. Some of the claimed embodiments involve the inclusion of additional data in the interaction database that describes "the effect that a compound selected from the first database has on a reference compound known to interact with a selected molecular target from the second database and said selected molecular target." See, e.g., pending Claim 1. In other words, the additional data describes the result of a three compound interaction (molecular target/reference compound/candidate drug compound), not the two compound interaction (molecular target/candidate drug compound) that takes place in step (2) of the above-

described drug development process. See also *As-Filed Application* pg. 30 line 15 – pg. 31 line 7. Independent claims 1, 33, 37, 139, and 142 specify the inclusion of the additional three compound interaction data.

All of the pending claims cover computer systems in which data from the three databases are extracted in order to predict the potential of the candidate compound as a drug.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Appellants respectfully request that the following grounds of rejection be reviewed on appeal:

1. The rejection of claims 1–3, 10, 14-23, 27, 28, 33-43, and 139-142 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Weinstein et al. (1997) (Weinstein hereafter) in combination with Antman et al. (1992)(Antman hereafter). (Please note that Applicants are NOT requesting review of the § 103(a) rejection of claims 59-64, 67, 68, 70-76, 78-105, 107, 108, 110, 120, 121, 124-129, 132, 144, and 145 over the combination of Weinstein and Antman)

VII. ARGUMENT

To warrant rejection under 35 U.S.C. § 103(a), all the claim limitations must be taught or suggested by the prior art. *See* MPEP § 2142.

1. 1–3, 10, 14-23, 27, 28, 33-43, and 139-142 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Weinstein in view of Antman. The combination of Weinstein in view of Antman does not teach or suggest all of the limitations of the rejected independent claims (claims 1, 33, 37, 139, and 142), and there is no motivation to combine the teachings of Weinstein and Antman.

The Weinstein reference does not disclose the use of a biological activity database in the manner specified in claims 1, 35, 37, 139, and 142. As explained above, claims 1, 35, 139, and 142 all contain a limitation that requires the use of a database that contains actual clinical data from both FDA-approved drugs and drugs that have failed clinical trials. See *As-Filed Application* pg. 16 lines 7 – 9, pg. 24 lines 16-22. The "chemical structure (S) database" discussed in Weinstein does not disclose the type of biological activity database specified in

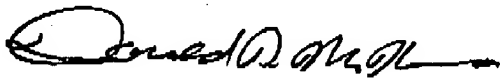
claims 1, 35, 37, 139, and 142. Instead, the "chemical structure (S) database" in Weinstein "contains molecular structural features of the tested compounds." Weinstein pg. 344 col. 1 lines 26-28. Therefore the "chemical structure (S) database" corresponds to the "chemical compound" database described in the portion of the *As-Filed Application* running from pg. 17 line 12 through pg. 20 line 21. The pending application specifies that biological activity data can be used in conjunction with chemical structure data (see *As-Filed Application* pg. 20 lines 15-18), but that doesn't change the fact that chemical structure data is distinct from the biological activity data, and that Weinstein fails to disclose the use of biological activity data. The pending Final Office Action essentially concedes that Weinstein fails to disclose the use of biological activity data since the Final Office Action relies on Antman to provide the limitation of "a first database of chemical compounds that have failed in preclinical or human clinical tests". Final Office Action pg. 5 lines 5-6. Applicants respectfully disagree with the assertion that Antman discloses the type of biological activity database specified in the claims, as well as the assertion that there is a motivation to combine Antman and Weinstein. Antman simply does not disclose a relational database that can be queried as required in the pending claims. Antman simply presents the results of the application of the statistical analysis technique known as meta-analysis to data collected from a variety of different sources. See Antman pg. 240, right-most column lines 25-30. Although the data analyzed in Antman included the results of clinical trials, there is no suggestion that those data could be placed into a relational database that could be used in conjunction with other relational databases containing molecular target information and screening results from *in vitro* assays. In other words, Altman does not appear to even hint at the concept of using a multiple database to facilitate compound selection for drug development. Unlike the types of automated analyses that can be carried out by embodiments of the invention, and in Weinstein, the analysis in Antman appears to have required the manual collection and analysis of data. Applicants submit that the disclosures of Weinstein and Antman fail to disclose all of the claimed limitations, in particular the limitation of a biological activity database, and that there is no motivation to combine those references. Therefore the claims containing the limitation of a biological activity database, which are independent claims 1, 35, 37, 139, and 142, as well as the claims dependent from those claims, are allowable over the combination of Weinstein and Antman.

The Weinstein reference also fails to disclose the limitation of data describing the result of a three compound interaction (molecular target/reference compound/candidate drug compound) See also *As-Filed Application* pg. 30 line 15 – pg. 31 line 7. Instead, Weinstein only appears to disclose the two compound interaction (molecular target/candidate drug compound) that takes place in step (2) of the above-described drug development process. Independent claims 1, 33, 37, 139, and 142 require the inclusion of the additional three compound interaction data. Since Antman also appears to fail to disclose the use of three compound interactions, independent claims 1, 35, 37, 139, and 142, as well as the claims dependent from those claims, are allowable over the combination of Weinstein and Antman.

VIII. CONCLUSION

For the reasons stated above, Appellants respectfully submit that their claims are allowable over the variously combined references. Appellants request that the present rejections of the claims under 35 U.S.C. § 103(a) be reversed and that the application be remanded to the Examiner so that the appealed claims can proceed to allowance.

Respectfully submitted,



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IX. APPENDIX OF CLAIMS ON APPEAL

1. A computer system comprising:

a first database containing, records corresponding to a plurality of chemical compounds and records corresponding to biological information related to effects of such chemical compounds on biological systems;

a second database containing records corresponding to a plurality of molecular targets;

a third database containing records corresponding to screening results from *in vitro* assays measuring interactions between each of a plurality of compounds in the first database and each of a plurality of molecular targets in the second database, the results including information on the effect that a compound selected from the first database has on the interaction between a reference compound known to interact with a selected molecular target from the second database and said selected molecular target;

a user interface allowing a user to provide the system with information about a new chemical compound; and

a query script that extracts information from the three databases that is relevant to the predictability of the potential use of the new compound as a drug.

2. The computer system of claim 1, wherein the interaction includes binding and the effect includes inhibitory effect.

3. The computer system of claim 1, wherein the chemical compounds include compounds with known biological activity.

4. The computer system of claim 1, wherein the chemical compounds include compounds that have been or are being tested in preclinical studies in animals.

5. The computer system of claim 1, wherein the chemical compounds include compounds known to have an effect on the environment.

6. The computer system of claim 1, wherein the chemical compounds include pharmacological reference agents.

7. The computer system of claim 1, wherein the chemical compounds include known pharmaceuticals in the market for clinical use for which there is a substantial amount of biological information available.

8. The computer system of claim 1, wherein the chemical compounds include drug candidates approved by the Food and Drug Administration for testing in humans.

9. The computer system of claim 1, wherein the chemical compounds include compounds obtained from natural sources that exhibit biological activity.

10. The computer system of claim 1, wherein the molecular targets include receptors.

11. The computer system of claim 1, wherein the molecular targets include enzymes.

12. The computer system of claim 1, wherein the molecular targets include nucleic acids.

13. The computer system of claim 1, wherein the molecular targets include carbohydrates.

14. The computer system of claim 1, wherein the records of the first database corresponding to a plurality of chemical compounds are organized in categories related to the description and properties of the compounds.

15. The computer system of claim 14, wherein the categories include: compound name;

compound type;

physical-chemical characteristics;

chemical space coordinates or structural descriptors; and

solubility.

16. The computer system of claim 1, wherein the first database includes a natural product database.

17. The computer system of claim 1, wherein the first database includes a database of chemical compounds that have failed in preclinical or human clinical tests.

18. The computer system of claim 1, wherein the first database includes a chemical registry database.

19. The computer system of claim 1, wherein the second database includes a three-dimensional structure database.

20. The computer system of claim 1, wherein the second database includes a sequence/mutation database.

21. The computer system of claim 1, wherein the second database includes a genomic database.

22. The computer system of claim 1, wherein the records in the third database corresponding to biological information related to the chemical compounds effects on the biological targets, are organized in categories that include:

compound name;

target name;

toxicity;

side effects; and

mechanism of drug action.

23. The computer system of claim 1 further comprising means for setting an interaction test threshold corresponding to said effect and means for selecting the compound when its use results in a test meeting the interaction test threshold.

24. A method for analyzing data relevant to drug discovery and development comprising:

selecting chemical compounds from a first database containing records corresponding to a plurality of chemical compounds;

selecting molecular targets from a second database containing records corresponding to a plurality of molecular targets;

producing information corresponding to the interactions between each of the selected chemical compounds and each of the selected molecular targets;

selecting a biological activity from a third database containing records corresponding to biological information related to effects of chemical compounds on biological targets; and

using the produced information to correlate patterns of interactions between chemical compounds and molecular targets associated with the selected biological activity.

25. The method of claim 24, wherein the step of producing information includes the steps of

generating binding data of the binding between each of the selected chemical compounds and each of the selected molecular targets by monitoring the inhibitory effect that an unknown compound has on said binding;

setting a binding test threshold corresponding to the inhibitory effect; and generating information on the combination of unknown compound, molecular

target, and chemical compound that meets or fails to meet the binding test threshold.

26. The method of claim 25, wherein the binding data comprises positive and negative binding information.

27. The computer system of claim 1, wherein the interaction includes binding.

28. The computer system of claim 1, wherein the chemical compounds include compounds with known biological activity or that have failed in preclinical or human clinical tests.

29. The computer system of claim 1, wherein the chemical compounds include compounds used in commerce as herbicides or pesticides.

30. The computer system of claim 1, wherein the chemical compounds include known pharmaceuticals approved for human clinical use by the Food and Drug Administration.

31. The computer system of claim 1, wherein the molecular targets include ion channels.

32. The computer system of claim 1, wherein the molecular targets include transporters or uptake sites.

33. A computer system comprising:

a first database containing data corresponding to a plurality of chemical compounds;

a second database containing data corresponding to a plurality of molecular targets;

a third database containing data corresponding to screening results from *in vitro* assays measuring the interactions between each of a plurality of compounds in the first database and each of a plurality of molecular targets in the second database, the results including information on the effect that a compound selected from the first database has on the interaction between a reference compound known to interact with a selected molecular target from the second database and said selected molecular target;

a user interface allowing a user to provide the system with information about a new chemical compound; and

a query script that extracts information from the three databases that is relevant to the predictability of the potential use of the new compound as a drug.

34. The computer system of claim 33, wherein the chemical compounds include compounds with known biological activity.

35. A computer system comprising:

a first database containing data corresponding to a plurality of chemical compounds and data corresponding to biological information related to effects of such chemical compounds on biological systems;

a second database containing data corresponding to a plurality of molecular targets;

a third database containing screening data corresponding to *in vitro* assays measuring interactions between each of a plurality of compounds in the first database and each of a plurality of molecular targets in the second database;

a user interface allowing a user to provide the system with information about a new chemical compound; and

a query script that extracts information from the three databases that is relevant to the predictability of the potential use of the new compound as a drug.

36. The computer system of claim 35, wherein the chemical compounds include compounds with known biological activity.

37. A computer system comprising:

a first database containing records corresponding to a plurality of chemical compounds and records corresponding to biological information related to effects of such chemical compounds on biological systems;

a second database containing records corresponding to a plurality of molecular targets; and

a third database containing records corresponding to screening results from *in vitro* assays measuring the interactions between each of a plurality of compounds in the first database and each of a plurality of molecular targets in the second database, the results including information on the effect that a compound selected from the first database has on the interaction between a reference compound known to interact with a selected molecular target from the second database and said selected molecular target;

a user interface that allows a user to provide the system with information about a new chemical compound; and

a query script that extracts information from the three databases that is relevant to the predictability of the potential use of the new compound as a drug.

38. The computer system of claim 37, wherein the user interface allows a user to view information from at least one of the first database, the second database, and the third database as it relates to a compound record in the first database.

39. The computer system of claim 37, wherein the user interface allows a user to view information from at least one of the first database, the second database, and the third database as it relates to a molecular target in the second database.

40. The computer system of claim 37, wherein the user interface allows a user to view information from at least one of the first database, the second database, and the third database as it relates to one or more interaction records in the third database.

41. The computer system of claim 37, wherein the interaction includes binding.

42. The computer system of claim 37, wherein the interaction includes binding and the effect includes inhibitory effect.

43. The computer system of claim 37, wherein the chemical compounds include compounds with known biological activity.

44 -57. (Canceled)

58. A system comprising: a memory including one or more data arrays of information associated with chemical compounds and molecular targets; and

a processor for executing a process for providing a user interface including: a representation of a selected chemical compound,

description information associated with the selected chemical compound, and biological information associated with the selected chemical compound.

59. A computer system comprising:

a first database containing records corresponding to a plurality of chemical compounds;

a second database containing records corresponding to a plurality of molecular targets;

a third database containing records corresponding to the screening results of *in vitro* assays to determine the interaction between each of a plurality of compounds in the first database and each of a plurality of targets in the second database,

a user interface allowing a user to provide the system with information about a new chemical compound; and

a query script that extracts information from the three databases that is relevant to the predictability of the potential use of the new compound as a drug.

60. The computer system of claim 59, wherein the third database includes records corresponding to the results of *in vitro* assays to determine the interaction between all of the compounds selected to comprise a compound set in the first database and all of the molecular targets selected to comprise a molecular target set in the second database.

61. The computer system of claim 59, wherein the third database includes records corresponding to the results of *in vitro* assays to determine the interaction between a majority of the compounds selected to comprise a compound set in the first database and a majority of the molecular targets selected to comprise a molecular target set in the second database.

62. The computer system of claim 59, further comprising: a fourth database containing records corresponding to the effect of chemical compounds contained in the first database on biological systems.

63. The computer system of claim 62, wherein the third database includes records corresponding to the results of *in vitro* assays to determine the interaction between all of the

compounds selected to comprise a compound set in the first database and all of the molecular targets selected to comprise a molecular target set in the second database.

64. The computer system of claim 62, wherein the third database includes records corresponding to the results of *in vitro* assays to determine the interaction between a majority of the compounds selected to comprise a compound set in the first database and a majority of the molecular targets selected to comprise a molecular target set in the second database.

65. The computer system of claim 59, wherein the first database contains records corresponding to a plurality of known biologically active chemical compounds selected from among representatives of the following categories:

(a) pharmacological reference agents used in receptor, ion channel, transporter, or enzyme screening assays;

(b) drug candidates that have been approved by the Food and Drug Administration for testing in humans, including those that have been discontinued from further development; and

(c) pharmaceuticals that have been approved for human clinical use by the Food and Drug Administration, including those that have been subsequently withdrawn from the market.

66. The computer system of claim 65, wherein the known biologically active compounds included in the first database are further selected from among the following:

compounds that have been tested in preclinical studies in animals; pesticides;
herbicides;
bioactive natural products;
agricultural chemicals; and
environmental chemicals.

67. The computer system of claim 59, wherein the second database contains records corresponding to a plurality of molecular targets selected from among representatives of the following categories:

(a) receptors;

(b) ion channels;

(c) transporters; and

(d) enzymes.

68. The computer system of claim 59, wherein the second database contains records corresponding to a plurality of molecular targets selected from among representatives of the following categories:

(a) receptors;

(b) ion channels;

(c) transporters; and

(d) enzymes.

69. The computer system of claim 67, wherein the molecular targets in the second database are related to drug discovery and development.

70. The computer system of claim 59, wherein the third database contains records corresponding to complete sets of results from a screening process.

71. The computer system of claim 59, wherein the records in the third database corresponding to the results of *in vitro* assays to determine the interaction between compounds in the first database and targets in the second database includes positive interactions and negative or lack of interactions.

72. The computer system of claim 59, wherein the *in vitro* assays to determine the interaction between compounds in the first database and the targets in the second database are based on binding interactions.

73. The computer system of claim 59, wherein the *in vitro* assays to determine the interaction between compounds in the first database and the targets in the second database measure the inhibition of binding by a compound in the first database with respect to a target in the second database in the presence of another compound, such as a reference agent or enzyme substrate, known to interact with the target.

74. The computer system of claim 59, wherein the *in vitro* assays used to generate results comprising the third database are ligand binding assays.

75. The computer system of claim 59, wherein the *in vitro* assays used to generate results comprising the third database are enzyme inhibition assays.

76. The computer system of claim 59, wherein the *in vitro* assays to determine the interaction between compounds in the first database and the targets in the second database measure functional activity.

77. The computer system of claim 59, wherein the *in vitro* assays used to generate results comprising the third database measure adenyl cyclase activity, inositol triphosphate, or neurotransmitter transport.

78. The computer system of claim 59, wherein the *in vitro* assays used to generate results comprising the third database are based on reporter gene assays or functional assays.

79. The computer system of claim 59, wherein the results of *in vitro* assays to determine the interaction between compounds in the first database and targets in the second database are recorded in the third database as numerical values.

80. The computer system of claim 59, wherein the results of *in vitro* assays to determine the interaction between compounds in the first database and targets in the second database are recorded in the third database as per cent inhibition values.

81. The computer system of claim 59, wherein the results of *in vitro* assays to determine the interaction between compounds in the first database and targets in the second database are recorded in the third database as potency values.

82. The computer system of claim 59, wherein the results of *in vitro* assays to determine the interaction between compounds in the first database and targets in the second database are organized in the third database in terms of whether or not the interaction values exceed a specified threshold.

83. The computer system of claim 59, wherein the results of *in vitro* assays to determine the interaction between compounds in the first database and targets in the second database are organized in the third database in terms of whether or not the interaction values fall below a specified threshold.

84. The computer system of claim 59, wherein the results of *in vitro* assays to determine the interaction between compounds in the first database and targets in the second database are organized in the third database in terms of whether or not the interaction values fall between specified upper and lower thresholds.

85. The computer system of claim 59, wherein the results of *in vitro* assays to determine the interaction between compounds in the first database and targets in the second database are organized in the third database in terms of profiles of numerical values or meeting specified threshold criteria for specific compounds from the first database with respect to panels of molecular targets in the second database.

86. The computer system of claim 59, wherein the results of *in vitro* assays to determine the interaction between compounds in the first database and targets in the second database are organized in the third database in terms of profiles of numerical values or of meeting specified threshold criteria for specific compounds from the first database with respect to panels of molecular targets in the second database and in formats that allow comparisons to be made (a) between such profiles among subsets of compounds in the first database or (b) between such profiles or groups of profiles of compounds in the first database and a comparable profile of interaction data for a compound or group of compounds not in the first database.

87. The computer system of claim 59, wherein the chemical compounds in the first database are selected from among the compound set comprising LOPAC (List Of Pharmacologically Active Compounds, Sigma/RBI).

88. The computer system of claim 59, wherein the chemical compounds in the first database are selected from among the compound set contained in United States Pharmacopeial Convention Inc.'s USP DI Series.

89. The computer system of claim 59, wherein records corresponding to the chemical compounds in the first database include at least one of the following:

chemical name; chemical formula; chemical structure; molecular weight;
physical chemical properties;
chemical space coordinates;
chemical structural descriptors;
solubility; and
logP.

90. The computer system of claim 59, wherein records corresponding to the chemical compounds in the first database include chemical structural descriptors that can be searched and analyzed using computer-based searching and data analysis methods.

91. The computer system of claim 59, wherein records corresponding to the chemical compounds in the first database are organized by chemical structural relatedness or as chemical descriptor arrays or tables.

92. The computer system of claim 59, wherein records corresponding to the chemical compounds in the first database include chemical structural descriptors that can be analyzed using methods of recursive partitioning.

93. The computer system of claim 59, wherein records corresponding to the chemical compounds in the first database include chemical structural descriptors that are organized in a format amenable to data analysis using CoMFA software or related methods.

94. The computer system of claim 59, wherein records corresponding to the chemical compounds in the first database include chemical structural descriptors that are organized in a format amenable to data analysis using Catalyst/Hypo software or related methods.

95. The computer system of claim 59, wherein records corresponding to the chemical compounds in the first database include SMILES codes.

96. The computer system of claim 59, wherein records corresponding to the chemical compounds in the first database include 2-D topological descriptors.

97. The computer system of claim 59, wherein records corresponding to the chemical compounds in the first database include 3-D pharmacophore descriptors.

98. The computer system of claim 59, wherein records corresponding to the chemical compounds in the first database include substructure or chemical moiety descriptors.

99. The computer system of claim 59, wherein the first database also contains records corresponding to biological information related to effects of the chemical compounds on biological systems.

100. The computer system of claim 99, wherein the records in the first database corresponding to biological information includes information on chemical name, trade names, or alternative compound names and at least one of the following categories:

toxicity;
side effects;
mechanism of action; and
pharmacokinetics.

101. The computer system of claim 100, wherein records in the first database corresponding to biological information related to pharmacokinetic effects of selected chemical compounds on biological systems includes information on at least one of the following categories:

bioavailability;

absorption;

drug distribution;

drug metabolism;

drug excretion;

blood-protein binding; and blood-brain barrier passage.

102. The computer system of claim 100, wherein records in the first database corresponding to biological information related to toxicological effects of selected chemical compounds on biological systems includes information on at least one of the following categories:

teratotoxicity;

mutagenicity; and

toxicity.

103. The computer system of claim 100, wherein records in the first database corresponding to biological information related to side effects of selected chemical compounds on biological systems includes information on at least one of the following categories:

known receptor interactions;

known enzyme interactions;

behavioral effect;

physiological effect; and

organ effects.

104. The computer system of claim 100, wherein records in the first database corresponding to biological information related to mechanism of action of selected chemical

compounds on biological systems includes information on at least one of the following categories:

target organ;

major pathway;

minor pathway; and

putative molecular target for mode of action.

105. The computer system of claim 99, wherein records corresponding to biological information related to effects of the chemical compounds on biological systems can be searched and analyzed using computer-based searching and data analysis methods.

106. (Canceled)

107. The computer system of claim 99, wherein records corresponding to biological information related to effects of the chemical compounds on biological systems are encoded using numerical terms such as LD50, ED50, percent absorbed, half-life, and peak concentration.

108. The computer system of claim 59, wherein the targets in the second database are selected from among those comprising the superfamily of G-Protein Coupled Receptors, including the following types and subtypes: dopamine, serotonin, adrenergic, muscarinic/acetylcholine, histamine, adenosine, angiotensin, bradykinin, C5a, chemokine, CCK, endothelin, neuropeptide Y, neurotensin, opioid, somatostatin, tachykinin, vasopressin, galanin, prostanoid, cannabinoid, platelet-activating factor, thyrotropin releasing factor, leukotriene, corticotropin releasing factor, PACAP, vasoactive intestinal peptide, melatonin, glutamate, and GABA-B.

109. (Canceled)

110. The computer system of claim 59, wherein the targets in the second database are selected from among those non-steroidal or steroidal intracellular receptors, including estrogen, glucocorticoid, progesterone, and testosterone.

111. (Withdrawn) The computer system of claim 59, wherein the molecular targets in the second database comprise kinases or phosphatases.

112. (Withdrawn) The computer system of claim 59, wherein the molecular targets in the second database are selected from among those comprising cytochrome P450 enzymes.

113. (Withdrawn) The computer system of claim 59, wherein the molecular targets in the second database are selected from among those comprising DNA-modifying enzymes or transferases.

114. (Withdrawn) The computer system of claim 59, wherein the molecular targets in the second database are selected from among those comprising neurotransmitter-related enzymes.

115. (Withdrawn) The computer system of claim 59, wherein the molecular targets in the second database comprise proteases or carbohydrates.

116. (Withdrawn) The computer system of claim 69, wherein the molecular targets related to drug discovery and development include nucleic acids.

117. (Withdrawn) The computer system of claim 69, wherein the molecular targets related to drug discovery and development include carbohydrates.

118. (Withdrawn) The computer system of claim 59, wherein the molecular targets in the second database are selected from among sodium, potassium, calcium, chloride, or ligand-gated channels.

119. (Withdrawn) The computer system of claim 59, wherein the molecular targets in the second database are selected from among transporters or uptake sites for dopamine, serotonin, norepinephrine, adenosine, glycine, glutamate, and choline.

120. The computer system of claim 59, wherein records corresponding to the molecular targets in the second database include at least one of the following: molecular target name;
molecular target family, classification or type;
corresponding gene DNA sequence;
amino acid sequence;
3-dimensional conformation or structure;
location of expression in tissues or cell types;
hydropathy plots; and
biochemical or molecular descriptors.

121. The computer system of claim 59, wherein records corresponding to the molecular targets in the second database are organized in a format amenable to computer-based searching and data analysis methods.

122. The computer system of claim 59, wherein records corresponding to the molecular targets in the second database are organized by DNA sequence alignments.

123. The computer system of claim 59, wherein records corresponding to the molecular targets in the second database are organized by DNA sequence homology.

124. The computer system of claim 59, wherein records corresponding to the molecular targets in the second database are grouped by family, superfamily, or subfamily.

125. The computer system of claim 59, wherein records corresponding to the molecular targets in the second database are organized by species source of the molecular target used in the *in vitro* assay to determine the interaction between chemicals and targets.

126. The computer system of claim 59, wherein records corresponding to the molecular targets in the second database are organized by location of expression in tissues.

127. The computer system of claim 59, wherein records corresponding to the molecular targets in the second database are organized by major or minor pathways.

128. The computer system of claim 59, wherein records corresponding to the molecular targets in the second database are organized by distribution of molecular target protein expression across different cell types.

129. The computer system of claim 59, wherein records corresponding to the molecular targets in the second database are organized by distribution of location of expression or across different cell types.

130. (Canceled)

131. (Canceled)

132. A computer system comprising:

a first database containing records corresponding to a plurality of chemical compounds,

a second database containing records corresponding to a plurality of molecular targets;

a third database containing records corresponding to the screening results of *in vitro* assays measuring the interaction between compounds in the first database and targets in the second database, wherein the third database includes records corresponding to the results of tests to determine the interaction between all possible combinations of the compounds selected to comprise a compound set in the first database and the molecular targets selected to comprise a molecular target set in the second database;

a user interface allowing a user to provide the system with information about a new chemical compound; and

a query script that extracts information from the three databases that is relevant to the predictability of the potential use of the new compound as a drug.

133. (Canceled)

134 - 138. (Canceled)

139. A computer system comprising:

a first database containing records corresponding to a plurality of chemical compounds and records corresponding to biological information related to effects of such chemical compounds on biological systems;

a second database containing records corresponding to a plurality of molecular targets;

a third database containing records corresponding to screening results from *in vitro* assays measuring interactions between each of a plurality of compounds in the first database and each of a plurality of molecular targets in the second database, the results including information on the effect that a compound selected from the first database has on the interaction between a reference compound known to interact with a selected molecular target from the second database and said selected molecular target;

a user interface allowing a user to provide the system with information about a new chemical compound; and

a query script that extracts information from the three databases that is relevant to the predictability of the potential use of the new compound as a drug.

140. The computer system of claim 139, wherein the new relationship is provided to determine correlations that are useful for drug discovery and development.

141. The computer system of claim 139, wherein the relationship is provided to determine patterns that are useful for drug discovery and development.

142. A computer system comprising:

a first database containing records corresponding to a plurality of chemical compounds and records corresponding to biological information related to effects of such chemical compounds on biological systems, wherein the first database includes a database of chemical compounds that have failed in preclinical or human clinical tests;

a second database containing records corresponding to a plurality of molecular targets;

a third database containing records corresponding to *in vitro* assays measuring interactions between compounds in the first database and molecular targets in the second database, the results including information on the effect that a compound from the plurality of compounds has on the interaction of a compound known to interact with a molecular target from the plurality of molecular targets and said molecular target;

a user interface allowing a user to provide the system with information about a new chemical compound; and

a query script that extracts information from the three databases that is relevant to the predictability of the potential use of the new compound as a drug.

143. (Canceled)

144. A computer system comprising:

a first database containing records corresponding to a plurality of chemical compounds, wherein the chemical compounds in the first database are selected from among the compound set contained in United States Pharmacopeial Convention Inc.'s USP DI Series;

a second database containing records corresponding to a plurality of molecular targets;

a third database containing records corresponding to the screening results of *in vitro* assays to determine the interaction between each of a plurality of compounds in the first database and each of a plurality of targets in the second database;

a user interface allowing a user to provide the system with information about a new chemical compound; and

a query script that extracts information from the three databases that is relevant to the predictability of the potential use of the new compound as a drug.

145. A computer system comprising:

a first database containing records corresponding to a plurality of chemical compounds, wherein records corresponding to the chemical compounds in the first database include SMILES codes;

a second database containing records corresponding to a plurality of molecular targets;

a third database containing records corresponding to the screening results of *in vitro* assays to determine the interaction between each of a plurality of compounds in the first database and each of a plurality of targets in the second database;

a user interface allowing a user to provide the system with information about a new chemical compound; and

a query script that extracts information from the three databases that is relevant to the predictability of the potential use of the new compound as a drug.

X. EVIDENCE APPENDIX

No documents are attached to this Evidence Appendix.

XI. RELATED PROCEEDINGS APPENDIX

As noted on page 2 of this Brief, Appellants are not aware of any related appeals, interferences, or judicial proceedings. Inasmuch as no decisions have been rendered by a court or the Board in any related case, no documents are attached to this Related Proceedings Appendix.